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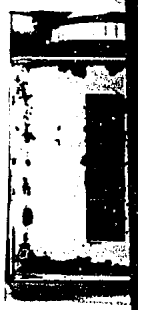

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USE OF LOW-GRADE COAL AND COAL WASTE

KIZEL COAL WITHOUT ADMIXTURE YIELDS EXCELLENT COKE

G. I. Deshalit

One of the most important tasks facing the USSR coke by-products industry is the increase in the types of coal that may be used to produce coke by making use of various types of local coals.

The Gubakha Coke By-Products Plant has been using a coking charge consisting of 15-20 percent imported Kuznetsk coal and 85-80 percent local Kizel coal. Kuznetsk coal has had to be transported 2,500 kilometers to reach the Gubakha plant, but it was considered necessary to incur this expense to produce high-grade coke from the standpoint of physical properties, and to eliminate the excessive formation of graphite on the walls of the coke oven.

A content analysis of the local coals used in the Gubakha plant and the names of the mines supplying the coal are given in the following table:

Mine	Content (in percent) Ash	Sulfur	Volatile Substance
Imeni Kalinin	10.6-11.8	3.7-4.2	39.7-41.81
Imeni Volodarskiy	9.3-11.2	3.6-3.7	39.05-40-26
Imeni Chkalov	8.5	3.2	44.0
Imeni Serov	10.3-10.5	3.8-3.9	40.7-40.74

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Kuznetsk coal (Anzhero-Sudzhensk) has an ash content of 7-10 percent, a sulfur content of 0.55-0.67 percent, and a volatile substance content of 13.75-17.05 percent.

Experiments have indicated that it is possible to obtain coke with high-grade physical properties from some types of Kizel coal without any admixture. Part of the coal is subjected to a certain amount of heat treatment and then combined with the untreated coal. Solution of the problem has two aspects: determining to what degree the coal should be heated and finding the proper proportions for the mixture of treated and untreated coal. Samples of the coal were heated to 300, 350, 400, 450, and 500 degrees centigrade and the volatile substance yield was 26.41 percent in the first case, 22.98 percent in the second, 18 percent in the third, 14.52 in the fourth, and 10.18 in the last.

The treated coal was combined in different proportions with untreated coal and coked at a temperature of ~1,000 degrees centigrade. A comparison of the resulting coke indicated that the most successful mixture consisted of 60-65 percent of the untreated coal and 40-35 percent of the treated coal which had been heated to a temperature of 450 degrees centigrade.

The coke obtained was completely satisfactory in external appearance, of a silvery color, with good physical and mechanical qualities, a complete absence of sponginess, and homogeneous throughout.

After laboratory tests had indicated the most suitable mixture of Kizel coals, an experimental coking was carried out with the mixture at the Khar'kov Coke By-Products Plant. The resulting coke was firm in structure, of a silvery-grey color, and with physical and mechanical properties not inferior to the best Donbass cokes.

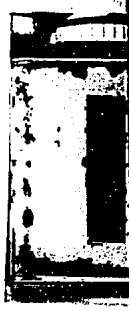
To test the toughness of the coke it was compared with high-grade coke from the Novo-Makeyevka Coke By-Products Plant and the quality of both types of coke was found to be approximately uniform.

The results of these experiments prove that it is possible to produce high-grade coke from Kizel coal alone without addition of any Kuznetsk Basin coal. Taking advantage of this fact will eliminate the expense of distant haulage, provide transportation facilities for other purposes, and greatly expand the coal reserves available for coking.

UTILIZATION OF COAL-CLEANING PLANT WASTE PRODUCTS FOR POWER FUEL

M. L. Kisel'g of, A. A. Orochko

The introduction of new coal-cleaning plants for washing assorted anthracite has resulted in an increase in the amount of waste in the form of wet anthracite culm (shlam). In the past this wet culm was almost never utilized but was simply accumulated in dump heaps. In the normal operation of a coal-cleaning plant 2 percent of the coal cleaned is lost as wet culm. This means that, if a mine delivers 2,500-3,000 tons of coal to the plant each 24 hours, 50-60 tons of wet culm are produced. Actually, imperfections in the technological process cause this figure to be raised to 60-75 tons.



In some plants there are dump heaps of as much as 50,000 tons, the result of years of accumulation. The moisture content of culm reaching the dump is 40-50 percent. After standing for a few days, it drops to 20-25 percent, and the average for culm that has been collecting for years is 16 percent. If the moisture content could be reduced to 7-9 percent, this wet culm could be used as fuel for electric power stations.

A comparison of the characteristics of wet culm with regular anthracite culm (shtyb) is given in the following tables:

Fuel Characteristics

	Wet Culm	Regular Culm
Moisture content, percent	12-17	6-8
Ash content, percent	30-33	19-19.5
Calorific value kilocal/kg	4,400-4,600	5,750-5,850
Coefficient of crushability, according to VTI	1.16	0.9-1.1

Melting Point of Ash

Temperature at beginning of deformation, deg C	1,150	1,015
Softening point, deg C	1,265	1,215
Liquefaction point, deg C	1,290	1,300

Granular Consistency

Residue in 2 by 2 mm-screen, percent	8-11.5	46-58
Residue in 1 by 1 mm-screen, percent	27.5-30.0	78-80
Residue in 0.208 by 0.208 mm-screen, percent	59.0-67.0	90-94
Residue in 0.088 by 0.088 - screen, percent	80.0-88.0	96-98

Experiments in burning wet culm at an electric power station located 52 kilometers from a coal-cleaning plant led to the following conclusions and recommendations:

1. If culm with a moisture content of 16 percent is combined with regular culm even in the proportion of 5.7 to 94.3 percent, the functioning of the power-station equipment will be impaired. However, when dried to a moisture content of under 10 percent, it makes good power-station fuel used in combination with regular culm.

2. Arrangements should be made to have the wet culm dried to a 7-9 percent moisture content at the coal-cleaning plant. Under such circumstances it would be possible to burn it in electric power stations throughout the year.

3. In summer the wet culm can be removed from the dump heap one layer at a time and dried to a moisture content of 10 percent.

4. At the power stations arrangements should be made for the even distribution of wet culm throughout the coal bunkers.

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